

other interested party concerning any aspect of this proposed rule are hereby solicited. Comments particularly are sought concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to *Harrisia portoricensis*;

(2) The location of any additional populations of *Harrisia portoricensis*, and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of the Act;

(3) Additional information concerning the range and distribution of this species; and

(4) Current or planned activities in the subject areas and their possible impacts on *Harrisia portoricensis*.

Final promulgation of the regulation on *Harrisia portoricensis* will take into consideration the comments and any additional information received by the Service, and such communications may lead to adoption of a final regulation that differs from this proposal.

The Endangered Species Act provides for a public hearing on this proposal, if requested. Requests must be filed within 45 days of the proposal. Such requests must be made in writing and addressed to the Field Supervisor, Caribbean Field Office, U.S. Fish and Wildlife Service, P.O. Box 491, Boquerón, Puerto Rico 00622.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the *Federal Register* on October 25, 1983 (48 FR 49244).

References Cited

- Ayensu, E.S., and R.A. Defilippis. 1978. Endangered and threatened plants of the United States. Smithsonian Institution and World Wildlife Fund, Washington, D.C., xv + 403 pp.
- Department of Natural Resources. 1986. Annual report for the yellow-shouldered blackbird project. San Juan, Puerto Rico.
- Liogier, H.A., and L.F. Martorell. 1982. Flora of Puerto Rico and adjacent islands: a systematic synopsis. University of Puerto Rico, Río Piedras, Puerto Rico. 342 pp.
- Vivaldi, J.L., and R.O. Woodbury. 1981. Status report on *Harrisia portoricensis* Britton. Unpublished status report submitted to the U.S. Fish and Wildlife Service, Atlanta, Georgia. 12 pp.
- Woodbury, R.C., L.F. Martorell, and J.G. García-Turdu. 1977. The flora of

Mona and Monito Islands, Puerto Rico (West Indies). Bulletin 252, Agricultural Experiment Station, University of Puerto Rico. Mayaguez.

The primary author of this proposed rule is Ms. Susan Silander, Caribbean Field Office, U.S. Fish and Wildlife Service, P.O. Box 491, Boquerón, Puerto Rico 00622 (809/851-7297).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Fish, Marine mammals, Plants (agriculture).

Proposed Regulation Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1543; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

2. It is proposed to amend § 17.12(h) by adding the following, in alphabetical order under Cactaceae, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Cactaceae—Cactus family:						
<i>Harrisia</i> (= <i>Cereus</i>) <i>portoricensis</i>	Higo chumbo	U.S.A. (PR)	T		NA	NA

Dated: September 25, 1989.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

[FR Doc. 89-24581 Filed 10-17-89; 8:45 am]

BILLING CODE 4310-55-M

50 CFR Part 17

RIN 1018-AB36

Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for *Sagittaria secundifolia* (Kral's water-plantain)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The Service proposes to determine an aquatic plant, *Sagittaria*

secundifolia (Kral's water-plantain), to be a threatened species under the authority contained in the Endangered Species Act (Act) of 1973, as amended. This species is currently known only from a single population in the Little River system in northeast Alabama (De Kalb and Cherokee Counties) and northwest Georgia (Chattooga County). A historical population from Town Creek (De Kalb County, Alabama) has not been located and is believed destroyed. This species is extremely vulnerable due to its restricted range and the clearing of the river banks for silvicultural, residential, agricultural or mining purposes. This proposal, if made final, would implement Federal protection provided by the Act for *Sagittaria secundifolia*. The Service

seeks data and comments from the public on this proposal.

DATES: Comments from all interested parties must be received by December 18, 1989. Public hearing requests must be received by December 4, 1989.

ADDRESSES: Comments and materials concerning this proposal should be sent to Complex Supervisor, U.S. Fish and Wildlife Service, Jackson Mall Office Center, 300 Woodrow Wilson Avenue, Suite 316, Jackson, Mississippi 39213. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Cary Norquist, at the above address (601/965-4900 or FTS 490-4900).

SUPPLEMENTARY INFORMATION:

Background

Kral (1982) described *Sagittaria secundifolia* from material collected by Cusick in 1972 from the Little River in Alabama. However, during his studies, Kral discovered earlier collections made in 1899 by the Biltmore Herbarium collectors from Little River and from Town Creek on Sand Mountain by Harper in 1951 (Kral 1982, Whetstone 1988). The Town Creek population in De Kalb County, Alabama, has not been relocated despite extensive searches and is believed destroyed (Kral 1982, 1983; Whetstone 1988). Currently *Sagittaria secundifolia* is only known to occur in the Little River drainage system of Lookout Mountain. This species is primarily located in the upper undammed reaches of the Little River in Cherokee and De Kalb Counties, Alabama. It has been collected from a single site in the East Fork of the Little River in Chattooga County, Georgia (Whetstone 1988, Whetstone *et al.* 1988). On rare occasions, individuals have been located near the mouth of tributaries (Whetstone 1988). Extensive surveys of other river systems with suitable habitat in northeast Alabama and northwest Georgia have been unsuccessful at locating additional populations (Whetstone 1988).

This species is a member of the water-plantain family (Alismataceae) and is in the "graminea" complex of *Sagittaria*. Distinguishing characters include a stout, elongated rhizome, hairy filaments, linear leaves and spreading or reflexed sepals (Kral 1982, Whetstone 1988).

Sagittaria secundifolia is a submersed to emersed aquatic perennial arising from a stiff elongated rhizome up to 10 centimeters (cm) (4 inches) in length. The leaves are of two types, depending upon the velocity and depth of the water it inhabits. In swift shallows, the leaves are linear, rigid and sickle-shaped, 5–8 cm (2–3 inches) long and 2–5 millimeters (mm) (0.08–0.20 inches) wide. In quite, deep waters, the leaves are more quill-like, being longer (10–30 cm) (4–12 inches), linear in shape and tapering. Separate male and female flowers are produced on a stalk, 10–50 cm (4–20 inches) long. The petals are inconspicuous in the female flowers; however, in the male flowers, they are white and 1.0–1.5 cm (0.4–0.6 inches) long. The fruit consists of a cluster of achenes approximately 2 mm (0.08 inch) in length. Although infrequent, flowering occurs from May into July and intermittently into the fall (Kral 1982, 1983).

This taxon typically occurs on frequently exposed shoals or rooted

among loose boulders in quiet pools up to 1 meter (3 feet) in depth. Plants are locally distributed, where suitable habitat exists, and grow in pure stands or in association with various submergents including *Potamogeton*, *Najas*, and *Myriophyllum* and emergents such as *Justicia americana*, *Lindernia*, and *Polygonum*. The immediate banks are often dominated by a thicket of shrubs including *Alnus*, *Rhododendron*, *Kalmia*, *Lyonia*, and *Ilex*. Sphagnum seeps are frequent with *Carex*, *Rhynchospora*, *Eriocaulon*, *Panicum*, *Xyris*, and *Rhexia* among the common genera present. The stream bottoms are typically narrow and bounded by steep slopes (Kral 1982, Whetstone 1988). Two endangered plants, *Sarracenia oreophila* and *Ptilimnion nodosum*, and several candidate plant (*Cuscuta harperi*, *Coreopsis pulchra*, *Allium speculae*) occur in associated habitats at several sites.

Approximately 40 percent of the habitat in Little River is owned by the Alabama Power Company, and 20 percent by the Alabama Department of Conservation and Natural Resources (DeSoto State Park). The remainder is in private ownership.

On September 27, 1985, the Service published a revised Notice of Review for plants in the Federal Register (50 FR 39528), which included *Sagittaria secundifolia* as a category 2 species. Category 2 comprises those taxa for which listing as endangered or threatened may be appropriate but existing information is insufficient to support a proposed rule. In 1986, the Service contracted a status survey to assess its rarity and evaluate threats to this species and its habitat. This report (Whetstone 1988) and other information support its proposed listing as a threatened species.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be endangered or threatened due to one or more of the five factors described in Section 4(a)(1). These factors and their application to *Sagittaria secundifolia* Kral (Kral's water-plantain) are as follows:

A. *The present or threatened destruction, modification or curtailment of its habitat or range.* *Sagittaria secundifolia* is only known from the Little River drainage system in northeast

Alabama and northwest Georgia. A major threat to this species is the elimination or adverse modification of its already limited habitat. Clearing of the adjacent river banks for silvicultural, residential-recreational development, surface mining or agricultural purposes poses a significant threat for this species. These activities contribute to water quality degradation and increase stream turbidity and siltation from erosion (Kral 1983, Whetstone 1988). Similar impacts likely caused the loss of the population and much of the suitable habitat in the Town Creek watershed (Kral 1982, 1983).

The Little River population may be adversely affected by eutrophication from garbage dumping and leaking sewage systems. Large quantities of human coliform bacteria were present in water samples taken at several sites along the Little River (Whetstone 1988). This eutrophication increases the presence of filamentous algae, which clings to individuals of *Sagittaria secundifolia*. Extreme water turbidity and dense filamentous algae decrease the amount of light available to the plants for growth and flowering.

A small number of sites are accessible by fords and are often a center for recreational activity, subjecting them to damage by off-road vehicle traffic.

Impoundments exist over large areas of presumed suitable habitat on the Little River and may have destroyed undocumented populations. Four large impoundments exist along a five mile stretch of the West Fork of the Little River and two are present below the Georgia locality on the East Fork. The impoundment of Lake Weiss in Cherokee County, Alabama, in the 1960s flooded suitable habitat along Yellow Creek and several miles of the Little River. In the past, dams along two creeks, which flow into the Little River, have broken and flooded portions of suitable habitat. Cracks and leaks have been observed on the dam above DeSoto Falls and a portion of a dam near the Georgia population has deteriorated (Whetstone 1988). Several existing populations are threatened by unstable impoundments that could break and eliminate or degrade populations and suitable habitat.

Approximately 33 percent of the habitat and associated local populations would be destroyed if a proposed hydroelectric impoundment is constructed on the Little River. In addition to flooding several local populations and changing stream flow dynamics, associated construction would cause excessive siltation and further degrade water quality

(Whetstone 1988). However, the Little River site is presently viewed as the least desirable site for this impoundment from an economic and environmental standpoint (John Grogan, Alabama Power Company, pers. comm., 1989).

B. Over-utilization for commercial, recreational, scientific or educational purposes. This species is not known to be a component of commercial trade; however, collection or vandalism could reduce populations in the more accessible sites.

C. Disease or predation. Disease and predation are not known to be factors affecting the continued existence of this species.

D. The inadequacy of existing regulatory mechanisms. *Sagittaria secundifolia* is informally listed as endangered in Alabama (Freeman 1984) and Georgia (T. Patrick, Georgia Heritage Program, pers. comm., 1989). However, this designation does not afford this species any legal status or protection. Plants located within the confines of the DeSoto State Park in Alabama are protected from collecting and adverse land use practices on the river banks. However, this provides protection for only 20 percent of the Little River population and the remaining sites are unprotected. The Act would strengthen existing protection, provide additional protection, and encourage active management for *Sagittaria secundifolia*.

E. Other natural or manmade factors affecting its continued existence. This species' occurrence in a single stream system makes it extremely vulnerable to any catastrophic event. Flooding is frequent and intense in certain areas, particularly those portions of the river within high canyon walls (Whetstone 1988). When such occurs, the water scours the bottom, uprooting the shallow-rooted *Sagittaria*. While a certain amount of flooding is natural, its detrimental effect is intensified due to the continuing loss of suitable habitat.

This species is clonal and reproduction is primarily asexual, which suggests there may be low genetic variability within this single existing population. Flowering was observed in only 1 percent of this *Sagittaria* and only in areas of direct sunlight and at a water level that allowed emergent leaves (Whetstone 1988). Many of the sites supporting local populations are in less than these optimum conditions for flowering; therefore, it is important to maintain as much suitable habitat as possible to encourage reproduction by sexual means. Sexual reproduction increases genetic variability, which enables species to adapt to changing

conditions. Eight of the twelve local populations studied by Whetstone (1988) occur in pools and/or in partially wooded areas. Here, the number of plants ranged from 5 to 40 individuals. The remaining 4 local populations on the shallow shoals supported 75 to several hundred plants.

Algae blooms are common in the summer due to eutrophication in the Little River (see factor A). *Sagittaria secundifolia* was observed to be completely covered with a filamentous algae at times, and this may have an adverse effect on this species' vigor (Whetstone 1988).

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to propose this rule. Based on this evaluation, the preferred action is to list *Sagittaria secundifolia* as threatened.

Threatened status seems appropriate since this species is not in imminent danger of extinction. However, this species is extremely vulnerable due to its restricted range and could become endangered in the foreseeable future if protection measures are not taken. Critical habitat is not being designated for reasons discussed in the following section.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary propose critical habitat at the time the species is proposed to be endangered or threatened. The Service finds that designation of critical habitat is not presently prudent for this species. Publication of critical habitat maps will increase public interest and possibly lead to additional threats for this species from collecting and vandalism, particularly at the many accessible sites along the river (see factor B in the "Summary of Factors Affecting the Species"). Taking is an activity difficult to control and only regulated by the Act with respect to plants in cases of (1) removal and reduction to possession of listed plants from lands under Federal jurisdiction, or their malicious damage or destruction on such lands; and (2) removal, cutting, digging up, or damaging or destroying in knowing violation of any State law or regulation, including State criminal trespass law. Such provisions are difficult to enforce and no benefit can be identified through critical habitat designation that would outweigh the potential threats of collecting and vandalism. All State agencies and Alabama Power Company have been notified of the general

location and importance of protecting this species' habitat. Protection of this species' habitat will be addressed through the recovery process and through the section 7 jeopardy standard. Therefore, it would not now be prudent to determine critical habitat for *Sagittaria secundifolia*.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

All known populations are under State or private ownership. A hydroelectric impoundment has been proposed for a site on the Little River where plants are known to occur. This would require a license from the Federal Energy Regulatory Commission. The Environmental Protection Agency would consider this species relative to pesticide use.

The Act and its implementing regulations found at 50 CFR 17.71 and

17.72 set forth a series of general trade prohibitions and exceptions that apply to all threatened plants. All trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.71, would apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale this species in interstate or foreign commerce, or to remove and reduce to possession the species from areas under Federal jurisdiction. Seeds from cultivated specimens of threatened plant species are exempt from these prohibitions provided that a statement of "cultivated origin" appears on their containers. In addition, for listed plants, the 1988 amendments (Pub. L. 100-478) to the Act prohibit the malicious damage or destruction on Federal lands and the removal, cutting, digging up, or damaging or destroying of listed plants in knowing violation of any State law or regulation, including State criminal trespass law. Certain exceptions apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.72 also provide for the issuance of permits to carry out otherwise prohibited activities involving threatened species under certain circumstances.

It is anticipated that few trade permits would ever be sought or issued because the species is not common in cultivation or in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, P.O. Box 3507, Arlington, VA 22203 (703/358-2104).

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any

other interested party concerning this proposed rule are hereby solicited. Comments particularly are sought concerning:

- (1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this species;
- (2) The location of any additional populations of this species and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of the Act;
- (3) Additional information concerning the range, distribution, and population size of this species; and
- (4) Current or planned activities in the subject area and their possible impacts on this species.

Final promulgation of the regulation on this species will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

The Endangered Species Act provides for a public hearing on this proposal, if requested. Requests must be received within 45 days of the date of publication of the proposal. Such requests must be made in writing and addressed to Complex Supervisor (see **ADDRESSES** section).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the *Federal Register* on October 25, 1983 (48 FR 49244).

References Cited

- Freeman, J.D. 1984. Vascular plant species critical to maintenance of floristic diversity in Alabama. Unpub. report. 23 pp.
- Kral, R. 1982. A new phyllodial-leaved *Sagittaria* (Alismaceae) from Alabama. *Brittonia* 34:12-17.
- Kral, R. 1983. A report on some rare, threatened, or endangered forest-related vascular plants of the South. USDA, Forest Service, Technical Publication R8-TP2. 1305 pp.
- Whetstone, R.D. 1988. Status survey of *Sagittaria secundifolia*. Provided under contract to the U.S. Fish and Wildlife Service, Southeast Region, Atlanta, Georgia. 28 pp. + attachments.
- Whetstone, R.D., C.L. Lawler, L.H. Hopkins, A.L. Martin, and C.C. Dickson. 1988. Kral's water-plantain, *Sagittaria secundifolia* Kral (Alismataceae), new to Georgia. *Castanea* 52:313-314.

Author

The primary author of this proposed rule is Cary Norquist (see **ADDRESSES** section) 601/965-4900 or FTS 490-4900.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Fish, Marine mammals, Plants (agriculture).

Proposed Regulation Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1543; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. It is proposed to amend § 17.12(h) by adding the following, in alphabetical order under Alismataceae, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Alismataceae:						
<i>Sagittaria secundifolia</i>	Kral's water-plantain	U.S.A. (AL,GA).....	T	NA	NA

* * * * *

Dated: September 30, 1989.

Richard N. Smith,
Acting Director, Fish and Wildlife Service.
[FR Doc. 89-24583 Filed 10-17-89; 8:45 am]
BILLING CODE 4310-55-M

50 CFR Part 17

RIN 1018-AB38

Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for *Astragalus cremnophylax* var. *cremnophylax* (sentry milk-vetch)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule:

SUMMARY: The Fish and Wildlife Service (Service) proposes to list *Astragalus cremnophylax* var. *cremnophylax* (sentry milk-vetch), as an endangered species under the authority of the Endangered Species Act of 1973 (Act), as amended. This plant is known from a single site on the South Rim of Grand Canyon National Park. The entire population consists of fewer than 500 plants. Park visitors at the site are trampling plants and degrading the habitat. This proposal, if made final, would implement Federal protection provided by the Act for sentry milk-vetch. The Service seeks data and comments from the public on this proposal.

DATES: Comments from all interested parties must be received by December 18, 1989. Public hearing requests must be received by December 4, 1989.

ADDRESSES: Comments and materials concerning this proposal should be sent to the Field Supervisor, Ecological Services Field Office, U.S. Fish and Wildlife Service, 3616 West Thomas Road, Suite 6, Phoenix, Arizona 85019. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Sue Rutman, at the above address (Telephone 602/261-4720 or FTS 261-4720).

SUPPLEMENTARY INFORMATION:

Background

Astragalus cremnophylax var. *cremnophylax* is a dwarf milk-vetch that is endemic to a single viewpoint on the South Rim of Grand Canyon National Park. The plant occurs in crevices and depressions with shallow soils on Kaibab limestone on a broad platform at the rim of the Grand Canyon gorge. This milk-vetch apparently prefers the

unshaded, well drained soils or limestone pavement in an opening in the pinyon-juniper woodland. Dominant species in the surrounding community include *Petrophytum caespitosum* (rock-mat), *Pinus edulis* (pinyon pine), *Juniperus osteosperma* (Utah juniper), *Cercocarpus intricatus* (little-leaf mountain mahogany), *Ephedra viridis* (Mormon tea), *Cowania mexicana* (cliffrose), *Artemisia bigelovii* (sagebrush), *Agropyron smithii* (wheatgrass), and *Poa pratensis* (bluegrass), (Phillips et al. 1982). Sentry milk-vetch and rock-mat are the two dominant species in the dwarf plant community that occurs on this limestone pavement.

Astragalus cremnophylax var. *cremnophylax* is usually less than one inch (2.5 cm) high and forms a mat 1-10 inches (2.5-25 cm) in diameter (McDougall 1964). The short, creeping stems have compound leaves less than 0.4 inches (1.0 cm) long composed of 5-9 tiny leaflets. The fruit is obliquely egg-shaped and densely hairy. Whitish or pale purple flowers are 0.2 inches (0.5 cm) long and appear from late April to early May. Seeds are set in late May-June (Phillips et al. 1982). The plants appear to be long-lived and have a thick tap root that penetrates the limestone surface to reach a more constant source of moisture.

A thorough count of all plants in 1988 indicated that the population contained 489 plants. A 1989 inventory of the monitoring plots established in 1988 indicated that the population declined about 10 percent. Data indicate the cause for this decline may be trampling by park visitors. The effects of trampling on both plants and their habitat may have been amplified by the below average rainfall in 1989.

In 1988, the seedling class comprised only 22.2 percent of the population. Given the trampled condition of most mature plants, a likely explanation for the small proportion of seedlings is that they are killed by trampling. Only those seedlings in sites relatively safe from trampling survive. Poor seed dispersal may also affect the number of seedlings.

Astragalus cremnophylax was first discovered in 1903 by Marcus E. Jones who reported it as "apparently common at Grand Canyon * * * on sandy ledges." He mistook the plant for *A. humillimus* Gray, of which only Brandegee's imperfect, now flowerless type from Mesa Verde, Colorado, is extant. Both are alike in diminutive stature and similar pubescence but differ in petioles and pods. Barneby and Ripley recollected the species in 1947 at a location west of El Tovar, Grand Canyon National Park. Barneby

described it as a new species in 1948. In 1979, Barneby distinguished a new variety, *A. cremnophylax* var. *myriorrhaphis* after plants were discovered by Ralph Gierisch and associates in 1978 on Buckskin Mountain in Arizona. The typical form then became *A. cremnophylax* var. *cremnophylax*.

On December 15, 1980, the Service published a revised Notice of Review for Native Plants in the Federal Register (45 FR 82480); *A. cremnophylax* was included in that notice as a category 1 species. Category 1 species are those for which the Service presently has sufficient information to support the biological appropriateness of their being listed as endangered or threatened species. The 1985 revision (50 FR 39526) of the 1980 notice included *Astragalus cremnophylax* var. *cremnophylax* in category 1, and moved *Astragalus cremnophylax* var. *myriorrhaphis* to category 3C. Category 3C includes taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal Lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Astragalus cremnophylax* var. *cremnophylax* Barneby (sentry milk-vetch) are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The population of sentry milk-vetch occurs at one of the scenic canyon viewpoints along the West Rim Drive at Grand Canyon National Park. During the summer months, a shuttle bus brings visitors to the area where they disembark in the paved parking lot. At other times, visitors may drive their own vehicles to this site. At all times of the year, this area can be reached by walking or hiking. Not all visitors use the paved walkway that transects the sentry milk-vetch's habitat. The area is flat, and many visitors walk from the parking lot directly to the rim, thus trampling any or all of the vegetation. The 1988 survey showed that 65 percent of all plants in the population had experienced some degree of trampling. More than half of